career at the Observatory has left memories which are still living among us. Wherever Arago was to read or speak there was eagerness to hear him, and this eagerness was manifested by all classes and by men in all stages of education, from the scholar who was charmed to see with what art the master could, in treating a difficult subject, seize the side which would render it intelligible to all, to the artisan astonished at being able to understand and to receive clear, precise ideas on matters which he believed for him to be absolutely inaccessible. The cause of this success, gentlemen, lay in the harmony of mental and physical gifts, which I attempted to characterise at the beginning of this speech. They lay above all in that superior comprehension of subjects which he had developed by his labours and discoveries. He who has created in science, teaches very differently from the most educated professor who has never stirred the bowels of a subject in order to get at fresh truths. There are three degrees in the knowledge of truth; namely, those of student, teacher, and discoverer. In order to practise in a superior manner in one of these degrees, it is necessary to be raised to a stage which dominates it. As has been truly said, one does not thoroughly understand that which one is unable to teach. I say even that inventors alone can teach in a transcendent manner. That is not to say that all inventors are popular teachers. There are men of genius who like to hold themselves aloof, and whom it pleases to keep from others the truths of which they possessed themselves without effort; there are others, who although rich in the faculties of invention, have none of those which make the professor. But when all these gifts are united, and when to a zealous spirit are added the faculties of a superior mind, then we have one of these great popular teachers whose action extends over a whole epoch. Such was Arago, and such the real character of his greatness.

Gentlemen, Arago's writings shall not only have been of service to the generation which enjoyed them so eagerly. We inherit them and we shall not be their sole posterity. Among them, indeed, how many *chefs-d'œuvre* will always be consulted, in spite of the advance of science, on account of the perfection of their form and their rare historical ideas.

This speech would be incomplete if we did not add some touches to the grand and sympathetic figure. Arago, indeed, has not only served science by his discoveries, his labours, his writings, and his teaching; he has served it also by the protection and the encouragement which he delighted to lavish on the young philosophers of the future, on inventors of merit, and on all those who called upon him with any title. Just now I cited the case of Fresnel, but twenty other examples, many of them illustrious, could still be invoked.

If we survey our *Comptes Rendus* we shall see the name of Arago constantly intervening, whether he deals with an important discovery, a meritorious work, or a remarkable invention. If the affirmations which he makes, or the praises which he believes to be merited encounter opposition, his speech then takes fire, he becomes excited and indignant, and overturns all obstacles. How many have had him as their all powerful advocate, who have subsequently forgotten it?

When Arago had to deliver a speech at the Academy on an important subject, it was quite an event. We know by tradition, for example, the impression caused at the sitting when Arago expounded the discovery of Daguerre, and the interest, the pleasure, the admiration which was produced in the hall on hearing this master of the mysteries of light, revealing the operations which allowed of the fixing of the figure in the camera-obscura. Among so many applications which his perspicacity foresaw for the admirable discovery, he was always struck by those which concerned astronomy.

Faye, one of Arago's students and our eminent co-worker, has sustained this idea and has signalised by many claims all the ways which can be devised for the application of photography to celestial phenomena.

Let us also recall the sittings when Arago explained the success of Grenelle's operations in the boring of wells, with which he was desirous of endowing the capital, and which we owe to his sagacity and to the perseverance by which he was able to triumph over general incredulity.

Finally among so many fruitful initiatives, let us remark in particular that which Arago took with regard to Vicat's pension. Arago proposed that a national pension should be given to the great engineer, to whom France owed so many fine works. There was only one almost forgotten precedent. Arago wished to create a brilliant one. This great spirit felt how much the institution of national pensions accorded to those who had wrought gloriously for the benefit of the country, and who in the struggle have forgotten themselves, would produce devotedness to the country. Let us apply generally, gentlemen, the example which is offered to us under the patronage of Arago. Let us give to the men, never very numerous, whose conspicuous services have received the recognition of the country, that proof of its justice. Then, even, though the recompense be materially modest, there will always be attached to it a special value, it will always excite the noblest emulation, because each reward that is thus offered in the name of the country becomes a medal.

Gentlemen, in the decline of his career, this great soul had worn out the body on which it had made such severe demands. His organs were no longer able to serve that powerful intelligence in realizing his scientific conceptions. Arago then gave a last proof of his generosity. Having conceived the project of a magnificent experiment on light, he went to the Academy, expounded his ideas, and invited the young philosophers to follow them out and to gather the glory of their realization. Thus it was that Foucault and Fizeau, aided by our eminent artist and colleague Bréguet, were brought to the works by which they have begun their great scientific reputation.

Shortly after, Arago, broken by disease, and feeling his end near, wished to bid a last farewell to that Academy which had held so great a place in his life, of which he was the organ for so many years, and where his voice, listened to, loved, and admired, had resounded for almost half a century. His death, on October 2, 1853, was a loss to the whole world.

VESBIUM

PROF. A. SCACCHI, who has been for some time engaged in chemical investigations on the lava which issued from Vesuvius during the year 1631, has recently made an interesting communication to the Royal Academy of Sciences at Naples with regard to the probable presence in these deposits of a new metal. The material which Prof. Scacchi has operated upon consists of delicate yellow incrustations found in the crevices of the lava, in company with atacamite and azzumite, and has been named by him *vesbine*, while the supposed new metal is termed *vesbium*. Both words are derived from the ancient name for Vesuvius mentioned by Galen in his work, "De Morbis Curandis" (Book v. Chap. 12). Vesbine is found to consist of silicates of copper, the alkalies, iron, aluminium, &c., together with small quantities of the salts of what receives the name vesbic acid. The latter is obtained in an impure state—containing traces of iron, aluminium, lead, and copper—by evaporating the solution of vesbine in hydrochloric acid to 170° C., extracting with water, treating the residue of silicic acid, and vesbiates with hydrochloric acid, filtering from silicic acid, evaporating again to 170°, and extracting with water. The dark green residue thus obtained formed the material for the series of investigations on which the discoverer

bases his claims to the existence of the new element. The characteristic properties thus far noted are the following :—When fused with phosphor salt, its compounds yield in the oxidising flame a reddish or brownish yellow bead, and in the reducing flame a green bead. The alkaline vesbiates are soluble in water. The compounds with the other bases are soluble in acids, but insoluble in water—with the solitary exception of the manganese salt. The zinc salt is green, the silver salt is of a reddish yellow. The acid solutions of the iron and aluminium salts are green. Addition of sulphuretted hydrogen causes a flocculent brown precipitate, while the liquid assumes a deep azure blue hue—one of the most distinctive properties of the acid. The yellow vesbiate of potassium when fused, turns black, and if then cooled is insoluble. If on the contrary the temperature is further elevated, the fused mass becomes transparent and is soluble on cooling. The analysis of the silver salt showed it to contain 47·58 per cent. of vesbic acid. This would give 105·29 as the equivalent weight of vesbic acid, and an atomic weight of about 130 or 162, according to the amount of oxygen in combination.

In view of the small quantity of but three grammes of vesbic acid which Prof. Scacchi has thus far succeeded in isolating, he very prudently desists from making any definite claims with regard to the certainty of the existence of vesbium, until he has obtained quantities sufficient to insure purity in the compounds and exactness in the analytical results.

Thus far it appears allied to vanadium or molybdenum, although not responding to the special tests of these metals. A more accurate determination of the atomic weight will also show whether it can fill the gaps in the groups containing these metals according to Mendeleeff's classification. T. H. NORTON

PRIZES OF THE PARIS ACADEMY OF SCIENCES

AT the annual meeting on March 1, the Academy of Sciences distributed a large number of prizes, besides the extraordinary prize awarded to Mr. Crookes for the "Ensemble de ses Expériences." The Poncelet prize has been granted to M. Moutard, Professor at the Polytechnic School, for his works in analysis; the Dalmont prize to M. Collignon, Engineer of the Ponts et Chaussées, for similar services rendered to mechanics. M. Collignon is the author of a treatise on rational mechanics, containing not less than five large 8vo volumes. The Lalande prize was granted to Mr. Peters, the well-known astronomer of Clinton, for the discovery of forty-three small planets, eighteen of them discovered in 1879. M. Trouvelot, the French astronomer who was banished in 1851, and settled in the United States, took the Valz prize for his descriptive designs of Mars, Jupiter, and Saturn, which are exhibited in the large hall of the Paris Observatory. M. Trouvelot's observations on Jupiter's spots were considered as deserving of special mention. The Lacaze prize for physics was awarded to M. Leroux, Professor to the School of Pharmacy for his researches on vapours, on chronographs, magneto-electric machines, and peripolar induction. The Lacaze prize for chemistry was granted to M. Lecoq de Boisbaudran for his discovery of gallium

A large number of the questions proposed for solution by the commissions of the Academy, have been left unsolved and unrewarded, such as the Plumey prize for improvements in steam navigation, the great prize of mechanics for any invention tending to enlarge the efficiency of French men-of-war, the Damoiseau prize for a revision of the theory of Jupiter's satellites, the Vaillant prize for improvements in phonetic telegraphy, the Breant prize (4,000*l.*) for a remedy against choleraic infection, and others.

It is alleged that the failure of these competitions is caused by the too narrow limits imposed on the competitors, and the want of interest felt by the learned public in the proposed subjects. It may be noticed that the practice of rewarding men of science for the whole of their works is gradually gaining ground. Mr. Crookes's prize, an "extraordinary" one, was proclaimed after all the others.

One of the most important functions of the Academy of Sciences is the distribution of these annual prizes, the number of which is considerable—not less than thirty-one, whose aggregate value is about 10,000*l.*, exclusive of the Breant prize for cholera (4,000*l.*). Four of these prizes are paid out of public money, others from sums bequeathed by individuals whose number is yearly increasing. Generally these sums are vested in the funds, and the interest is employed in granting prizes, sometimes yearly, sometimes every two or three or four years. Some of the prizes to be delivered in 1880 are an exception to the rule, and the money is to be given *at once* if any one be found deserving it, according to the verdict of the Academical Commission.

The sitting was opened by an address delivered by M. Daubrée, and after the proclamation of the prizes, M. Bertrand, Perpetual Secretary, read the *éloge* of M. Belgrand, a free Academician, who died recently. He was engineer of the Ponts et Chaussées, and the head of the water service in the city of Paris. It was M. Belgrand who superintended the construction of the aqueduct, which from an immense distance brings within the fortifications of Paris an inexhaustible supply of pure spring water. In prefacing his address M. Bertrand remarked that the number of departed academicians who, from 1666 up to 1880 had not had the advantage of having their *éloge* pronounced by the Perpetual Secretary, amounts to seventy-two, amongst whom are Napoleon I., who was a member of the section of Mechanics, Leon Foucault, and Arago!

ARTIFICIAL DIAMONDS

AN unusually large audience gathered at the Royal Society last Thursday to hear Mr. Hannay's account of his artificial diamonds.

The President, after inviting discussion of the paper by Messrs. Hannay and Hogarth, observed that probably the large audience had assembled more especially in consequence of the general interest attaching to the next paper on the artificial formation of the diamond, and he felt that the valuable investigation just detailed showed Mr. Hannay to be a person worthy of attention when he claimed to have made even so startling a discovery as that on the face of this next communication. With regard to this the President observed that the attitude of science was always sceptical, and the Society would need ample proof that the metamorphosis of carbon into diamond had been really effected. But when once it has been proved, even with regard to the most microscopic particle, the scepticism of scientific men would cease for ever. And he reminded the Society that the present was only a preliminary notice dealing with the statement that headed it, and that a more complete memoir detailing the process would be eagerly expected by the Fellows of the Royal Society.

The following paper by Mr. Hannay was then read by Prof. Stokes :—

While pursuing my researches into the solubility of solids in gases, I noticed that many bodies, such as silica, alumina, and oxide of zinc, which are insoluble in water at ordinary temperatures, dissolve to a very considerable extent when treated with water-gas at a very high pressure. It occurred to me that a solvent might be found for carbon; and as gaseous solution nearly always yields crystalline solid on withdrawing the solvent or lowering its solvent power, it seemed probable that the